

**MISSOURI DEPARTMENT OF NATURAL RESOURCES
AIR AND LAND PROTECTION DIVISION
ENVIRONMENTAL SERVICES PROGRAM
Standard Operating Procedures**

SOP #: MDNR-FSS-101 EFFECTIVE DATE: May 10, 2003

SOP TITLE: Field Measurement of Water Temperature

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SUMMARY OF REVISIONS: Revisions include format changes and the addition of using conductivity, pH, and dissolved oxygen meters with temperature compensation for measuring temperature.

APPLICABILITY: This SOP is applicable to all department personnel who perform temperature measurements in the field.

DISTRIBUTION: MoDNR Intranet
ESP, SOP Coordinator

RECERTIFICATION RECORD:

Date Reviewed				
Initials				

1.0 SCOPE AND APPLICABILITY

- 1.1 Water temperature values are a necessary component in the determination of several other water quality parameters. For example, specific conductance, dissolved oxygen, and pH values are all temperature dependent. The conductivity, dissolved oxygen, and pH meters at ESP have built-in temperature compensation. Temperature values **must** be determined when a meter is used that does not compensate for temperature.
- 1.2 Temperature value alone may be a good indicator of water quality. Stream or lake temperatures that are excessively elevated due to wastewater or cooling water discharges will likely cause aquatic degradation.

2.0 HEALTH AND SAFETY REQUIREMENTS

- 2.1 Personnel should participate in the medical monitoring program in accordance with MDNR's medical monitoring policy. Those personnel routinely exposed to wastewater of domestic origin should be vaccinated for Hepatitis A as described in MDNR's Hepatitis A Prevention vaccine policy. This policy can be viewed on MDNR's intranet Health and Safety information page.
- 2.2 Appropriate protective gear such as disposable gloves and waders (during stream/lake sampling) should be worn by personnel for protection from water-borne illnesses. It is also advisable to frequently wash hands with soap and water, especially before eating or drinking.

3.0 PERSONNEL QUALIFICATIONS

Field personnel should be trained in field sample collection procedures, i.e. personnel should have taken a basic sampling workshop, the department-sponsored inspection and enforcement training, and/or been trained by an MDNR employee knowledgeable in the collection of field samples. Personnel should also be familiar with all applicable standard operating procedures (See MDNR-FSS-002 *Field Sheet and Chain-of-Custody Record*, MDNR-FSS-004 *Field Documentation*, MDNR-FSS-005 *General Sampling Considerations Including the Collection of Grab, Composite, and Modified Composite Samples from Streams and Wastewater Flows*).

4.0 SUPPLIES AND EQUIPMENT

The following equipment may be used to measure water temperature:

- An "Enviro-safe" brand alcohol-filled thermometer
- A mercury-filled thermometer *
- A pH meter with temperature compensation
- A conductivity meter with temperature compensation
- A dissolved oxygen meter with temperature compensation

* Mercury-filled thermometers are still acceptable and accurate tools for measuring water temperatures. However, due to the risk of accidental breakage and release of hazardous mercury, the ESP has stopped using mercury-filled thermometers and encourages others to do so.

5.0 PROCEDURE

- 5.1 Place the thermometer or probe (if using a meter) directly into the body of water or aliquot of water to be measured. Refer to the appropriate SOP for instructions on meter use (See MDNR-FSS-100 *Field Analysis of Water Samples for pH*, MDNR-FSS-102 *Field Analysis of Specific Conductivity*, and MDNR-WQMS-103 *Sample Collection and Field Analysis for Dissolved Oxygen Using a Membrane Electrode Meter*). Allow ample time for the reading to stabilize (approximately 1 minute).
- 5.2 Temperature should be recorded without removing the thermometer or probe from the water in order to avoid interference from ambient air and wind.

6.0 QUALITY ASSURANCE/QUALITY CONTROL

All thermometers and meters must be checked for Quality Control (QC) monthly by ESP personnel following MDNR-WQMS-213 *Quality Control Procedure for Checking Water Quality Field Instruments*. Probes or thermometers must be replaced if the temperature readings are not within the limit of $\pm 1^{\circ}\text{C}$ of the NIST (National Institute of Standards and Technology) certified thermometer (or per the manufacturers stated accuracy for temperature).

7.0 REFERENCES

MDNR-FSS-002 *Field Sheet and Chain-of-Custody Record*

MDNR-FSS-004 *Field Documentation*

MDNR-FSS-005 *General Sampling Considerations Including the Collection of Grab, Composite, and Modified Composite Samples from Streams and Wastewater Flows*

MDNR-FSS-100 *Field Analysis of Water Samples for pH*

MDNR-FSS-102 *Field Analysis of Specific Conductivity*

MDNR-WQMS-103 *Sample Collection and Field Analysis for Dissolved Oxygen Using a Membrane Electrode Meter*

MDNR-WQMS-213 *Quality Control Procedure for Checking Water Quality Field Instruments*

Standard Methods for the Examination of Water and Wastewater, 20th Edition. 2000.